

envelope, its only effect is to cause its inflation and its separation from the vitellus.

The presence of a proper membrane around the unfecundated ovum of the sea-urchin seems to me to be indubitable. We are not to imagine in this case a thin layer of hyaline non-granular protoplasm presenting only the appearance of a membrane. At the first glance a distinctly marked double contour renders any such interpretation impossible. If, therefore, it be supposed that the penetration of the spermatozoid is indispensable for fecundation, we have to inquire how it can get through such an obstacle, especially if we assume that this penetration can be effected at any point of the surface of the ovum.—*Comptes Rendus*, March 26, 1877, p. 620.

*On some Abnormal Fecundations in Starfishes.*

By M. H. FOUL.

In a former note I described the modifications undergone by the mature ova of *Asterias glacialis* when they are merely placed in sea-water, and the phenomena of an artificial fecundation performed with ova already freed from their polar materials. Let us now try the fecundation of the ova immediately after their escape from the ovary, or at least before the expulsion of the first polar corpuscle.

The details of the penetration of the zoosperms into the vitellus are very nearly the same as in the normal case. The principal difference is that the vitelline membrane is only very slowly formed and elevated round the point where the penetration is effected; instead of rapidly gaining the whole surface of the vitellus, it only extends over a portion of the periphery. Hence other spermatozooids have time to penetrate successively at different points of the surface of the ovule; and they continue to do so until the vitellus is completely enclosed in a membrane impermeable to the zoosperms.

The extent and rapidity of formation of the portions of the membrane which are differentiated round each point of penetration are very variable, and are less in proportion as the normal conditions are more widely departed from. In such cases I have counted as many as fifteen zoosperms in a single vitellus; and this number decreases as we operate under more normal conditions.

The body of the zoosperm flows into the vitellus; and at this point there is formed a clear spot surrounded by radiating filaments. This is the male aster. These male asters, starting from various points of the surface of the vitellus, travel slowly in the direction of its centre. Except as regards the number of asters, all this is in conformity with the normal case. If the fecundation takes place before the disappearance of the germinal vesicle, the male centres remain for a considerable time in a latent state, and it is only at the moment when the first polar corpuscle begins to issue, sometimes even already at the moment when the waste amphiaster is

formed, that the male asters show themselves, each at a little distance from the spot where a zoosperm has penetrated. Several of the radiating filaments extend from the centre of the star to the point of the surface of the vitellus where the contact took place, a point which is still recognizable by the presence of a small scar. It is no doubt these filaments that M. O. Hertwig has mistaken in the urchin for the tail of the spermatozoid.

The male asters gain in distinctness as they depart from the margin of the vitellus; and in their centre is formed a little mass of protoplasm, which we may call a *male pronucleus*. The male pronucleus nearest to the female pronucleus amalgamates with the latter, which immediately becomes the centre of a system of radiating filaments; then this combined nucleus unites again with a second, and sometimes even with a third, male pronucleus. At other times the female pronucleus divides, at the very moment of its formation, into two or three fragments, which then unite with so many male centres. The male asters never unite with each other; it would appear that they repel one another and are attracted by the female centre until the moment when the latter is neutralized by its union with two or three male centres.

The segmentation of these ova is very irregular. When the male centres are numerous the vitellus forms at once as many rounded bosses as it contains male asters, each boss having an aster in its centre; then these bosses become spherules, which continue dividing dichotomously. From this results a very irregular blastosphere and a monstrous larva.

In cases in which the number of male centres is very restricted, and the female pronucleus is divided into two or three nuclei, these always remain distinct. At the moment of the first segmentation each becomes converted into an amphiaster, and the vitellus divides at once into four or six spherules. I have not observed the segmentation in the ova, the single nucleus of which is the result of the combination of the female pronucleus with several male asters. Perhaps we must refer to this category the ova (which I have often met with) in which the nucleus is at once resolved into a tetraster—that is to say, four asters united to each other.

Can a vitellus which has received two zoosperms be developed in a normal manner? I do not venture to deny this absolutely; but I have always observed the contrary; I have always seen these ova produce a double number of segmentation-spherules, and finally become monstrous larvæ. Is not this fact fitted to put us on the track of a whole category of double monsters?

Analogous phenomena are presented in ova fecundated at maturity, but proceeding from animals which have suffered in captivity. Having fecundated some ova derived from a very sickly parent, I saw the zoosperms penetrate in numbers into each vitellus, and their bodies remain intact in the midst of the vitelline substance, although they were surrounded by some ill-marked radiating lines. They all

travelled in the direction of the germinal vesicle, which disappeared ; but the development went no further.

With this exception, I have never succeeded in discerning the body of the zoosperm in the interior of the vitellus. I do not think that it persists ; I much rather believe that the male centre is the product of the fusion of this body with a little vitelline protoplasm. The attraction that the zoosperm exerts upon the vitelline substance, and especially upon the female pronucleus, seems to me to be placed beyond doubt by observations that I have described. The mutual repulsion of the male centres appears to me to be a corollary of their attraction for the female centre, just as the repulsion exerted upon one another by the two poles of an amphiaster is the corollary of the attraction they exert upon the surrounding protoplasm.—*Comptes Rendus*, April 2, 1877, p. 569.

*On two new Genera and Species of Lizards from South America and Borneo.* By Dr. STEINDACHNER.

The genus *Tejovaranus* forms a transition towards the family Ameividae, and is distinguished from the typical Varanidae, which belong to the eastern hemisphere, by the presence of pterygoid teeth, by the elongate cordate form of the tongue, which has no sheath at the base, and by the size of the mental and rostral scutes and of the upper and lower labial scutes. Ventral scutes flat, quadrangular, in regular transverse rows, like the small slightly convex dorsal scutes. *Tejovaranus Branickii* is marked like *Tejus teguexin*, Linn., and has a large light-yellowish brown spot on the nape.

The genus *Lanthonotus* is characterized by the absence of an external ear. The head is depressed, oval, covered with very small, partly keeled scutes ; the back bears several rows of large tubercles, upon each of which lies, as if imbedded, a keeled horny scute ; the tongue is elongate cordate, papillose, without a sheath. The extremities and the toes are short, and the eye remarkably small. In the author's opinion, the genus *Lanthonotus* is the representative of a distinct family, which would most closely approach the Mexican Helodermidae.

*Lanthonotus borneensis* is tile-red on the back, and marked with brown on the yellow ventral surface. The skin of the back forms innumerable slight verruciform elevations, among which there are six, and in some parts eight, longitudinal rows of large tubercles, each of which bears a keeled scale. The flat ventral scutes are pointed behind and slightly imbricated. The tail is roundish.—*Anzeiger der kais. Akad. der Wiss. in Wien*, July 5, 1877.